Forest Insect & Disease Management
Pacific Northwest Region

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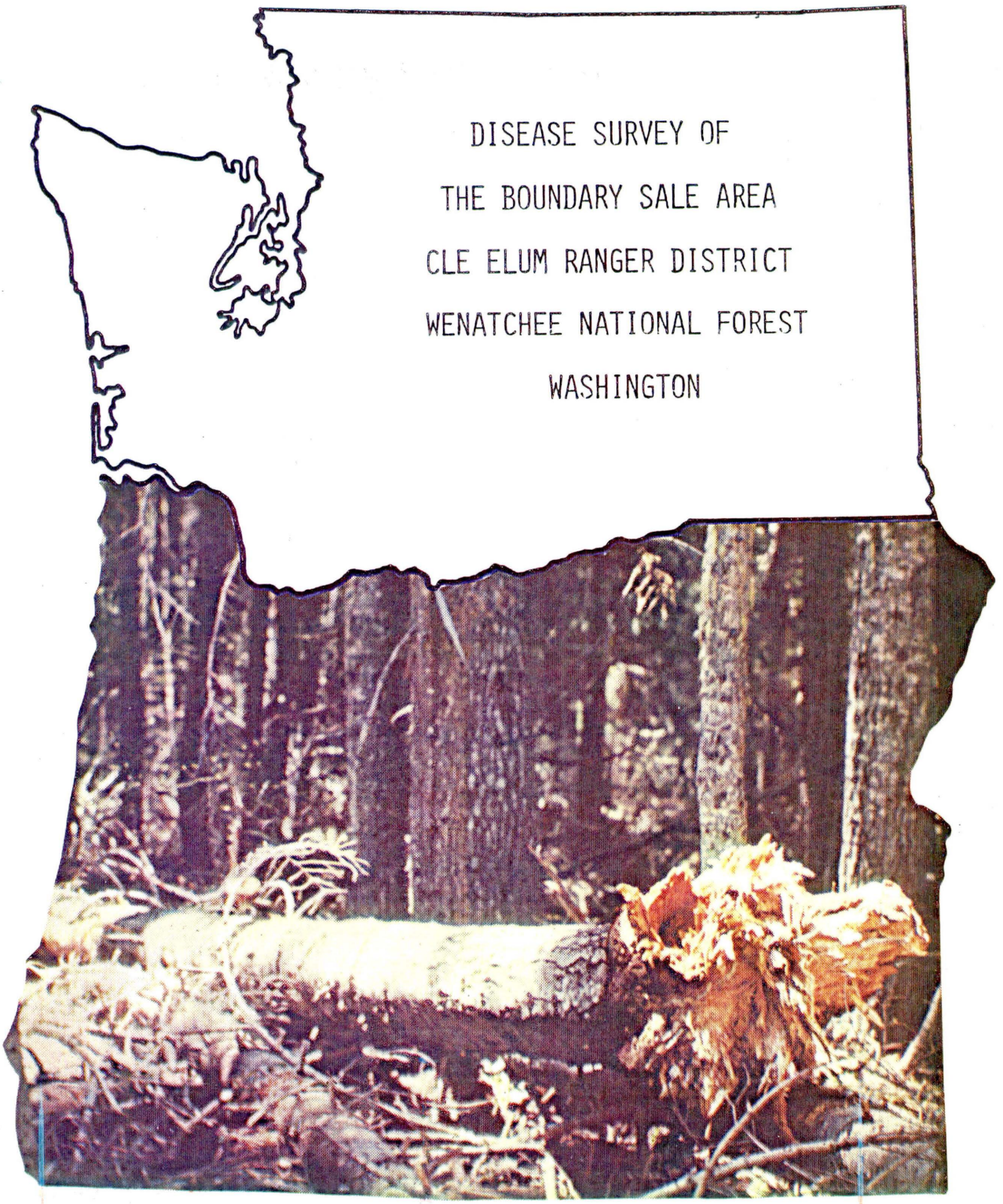

DISEASE SURVEY OF

THE BOUNDARY SALE AREA

CLE ELUM RANGER DISTRICT

WENATCHEE NATIONAL FOREST

WASHINGTON

1981

Disease Survey of the Boundary Sale Area, Cle Elum Ranger District, Wenatchee National Forest, Washington

by Gregory M. Filip

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SUMMARY

Approximately 600 acres were surveyed for damage caused by forest pests. Two diseases; laminated root rot affecting grand fir, Douglas-fir, and western larch; and dwarf mistletoe affecting Douglas-fir and larch are seriously impacting productivity of these species on the site. Also, past epidemics of mountain pine beetle have severely reduced the growing stock of white pine. Management alternatives for reducing pest damage are discussed.

INTRODUCTION

On July 30, 1980, we were requested by Cle Elum Ranger District personnel to examine the proposed Boundary Sale Area (Figure 1) for root diseases. Upon cursory examination, several small root disease centers caused by *Phellinus weirii* were found. Recommendations were given to examine systematically the entire sale area (approximately 600 acres), to locate large root disease centers.

The stand in the sale area is uneven-aged and composed primarily of grand fir *(Abies grandis)* and Douglas-fir *(Pseudostuga menziesii)* with some western larch *(Larix occidentalis)* and western redcedar *(Thuja plicata)*. Western white pine *(Pinus monticola)*, lodgepole pine *(P. contorta)*, ponderosa pine *(P. ponderosa)*, and western hemlock *(Tsuga heterophylla)* occur infrequently Part of the sale area had been partially cut less than 5 years ago (Figure 2). The remainder of the sale area had received little or no previous cutting. In 1976, part of the sale area was aerially sprayed with malathion to control an infestation of western spruce budworm (*Choristoneura occidentalis*). Elevation of the sale area ranges from 2,600 to 4,300 feet with slopes up to 50° near the upper end.

OBJECTIVES

Objectives of our evaluation were to:

1. Determine incidence (trees per acre, basal area per acre, and volume per acre) of major diseases and insect damage in the proposed sale area.

2. Prepare maps showing location and intensity of major diseases and insect damage in the proposed sale area.

3. Formulate pest management alternatives from the collected data.

METHODS

The sale area was surveyed using fixed-radius (1/100 acre) and variable (40 BAF) plots located at 2-chain intervals along transects 10 chains apart. Only trees with DBH greater than or equal to 5.0 inches were included in the variable plots. Trees less than 5.0 inches DBH and greater than or equal to 6 inches in height were included in the fixed-radius plots.

Data were collected for all trees on every fifth plot. On all other plots, data were recorded only for dead trees or living trees with disease or insect infestations. Basal area was determined for all plots.

The following data were collected for each plot tree: (1) species, (2) DBH, (3) condition (healthy, recent kill, live infected or infested, snag, stub, or down dead), and (4) cause of disease or mortality. Dead trees (standing or fallen) with intact bark on less than half of their circumference at the root collar were considered to have been dead for more than 20 years and were not measured.

Root disease was detected by chopping at the root collar and by limited excavation and dissection of roots near the root collar. Only dead or highly symptomatic trees were examined. No attempt was made to detect root disease in living trees with few or no above-ground symptoms. Laminated root rot was detected by the presence of white ectotrophic mycelium on the surface of excavated roots or by the presence of laminated decay with setal hyphae. Annosus root rot was detected by its characteristic white stringy rot. Armillaria root rot was detected by the presence of mycelial fans beneath the bark at the root collar or by yellow stringy decayed wood.

Dwarf mistletoe was detected by the presence of witches'-brooms and/or branch swellings. Insect damage, primarily caused by bark beetles, was identified by removing sections of bark at DBH and observing gallery patterns on dead or dying trees.

Cubic and board foot volumes were calculated from diameters and heights collected from sample trees representing all diameter classes within a species. Form classes were obtained from District records. Cubic foot volumes were calculated to a top diameter of 4.0 inches on all trees 6.0 inches DBH or greater. Board foot volumes were calculated to an 8.0 inch top diameter on all trees 10.0 inches DBH or greater.

RESULTS

Approximately 600 acres of the proposed Boundary Sale (including 100 acres already cut) were surveyed systematically with 333 fixed-radius and variable plots (0.6 plot per acre). Ninety-seven plots (29%) had trees that were infected and killed by one or more root pathogens (Figure 2). More plots were probably infected since entire root systems were not examined. One-hundred and one plots (30%) had trees with dwarf mistletoe, and nearly half of the infected trees were dead (Figure 3). Fifty-one plots (15%) had trees that were killed by bark beetles (Figure 4). Sixty-three plots (19%) had two or more major pest problems present. Only seven plots (2%) had no trees, and these were either located on roads (3 plots) or in old root disease centers (4 plots).

Distribution of Pest Damage

Root diseases and dwarf mistletoes occur more extensively in the lower and middle elevations of the sale area (Figures 2 and 3). South of the ridge, root diseases and bark beetle damage appear to increase. Bark beetle damage appears to be equally distributed over the remainder of the sale area (Figure 4).

Pest Damage in Cut vs. Uncut Areas

Most of the mortality in residual trees in the previously harvested section of the sale area (cut strata) was classified as "dead-unknown" (Tables 1A, 1B, 1C, and 1D). The majority of these trees probably died from damage associated with the logging activity. Some of the residual stand was infected by one or more root pathogens, primarily laminated root rot caused by *Phellinus weirii*, and most of these trees were dead. Dwarf mistletoe was found in some of the residuals, but most of the trees were alive. Some of the mortality was caused by bark beetles, primarily fir engravers *(Scotytus ventralis)*.

In the uncut strata, most of the mortality was caused by one or more root pathogens, primarily laminated root rot (Tables 2A, 2B, 2C, and 2D). Dwarf mistletoe was also present in the uncut stand, most of the trees being alive. Bark beetle-caused mortality, chiefly by mountain pine beetle *(Dendroctonus ponderosae)* was evident in the stand. Bark beetles and root diseases commonly were found on the same tree. Many of the smaller trees classified as dead-unknown probably died as a result of suppression. Some larger trees were too deteriorated to determine the exact cause of death.

In general, the cut strata had about the same percentage of trees killed by root disease in the residuals as did the uncut strata. However, the cut strata had a lower proportion of standing dead trees attributable to dwarf mistletoes or bark beetles than the uncut strata. The cut strata had almost twice the percentage of trees classified as dead-unknown as the uncut strata. However, trees classified as dead-unknown in the cut strata were in smaller diameter classes than in the uncut strata, and much of the mortality may have been associated with logging activity.

TREE SPECIES DESCRIPTIONS - UNCUT STRATA

GRAND FIR

Grand fir is the most prominent tree species by stem count but not basal area or volume. The most serious pest limiting this species in the area is laminated root rot (Tables 3A, 3B, 3C, and 3D). Some of the trees were killed by both laminated root rot and fir engravers. Both laminated root rot and annosus root rot commonly were found associated with dead saplings, especially near large old-growth stumps, the probable source of infection.

Mortality due to unknown causes was especially heavy in seedlings and saplings. Many trees in these younger age classes probably died from suppression in the dense uncut stands. Some mortality may have been caused by past western spruce budworm epidemics. Larger trees were often too deteriorated to determine cause of death.

Indian paint fungus *(Echinodontium tinctorium)*, usually common in old-growth grand fir stands, was found infrequently fruiting and appears not to be a serious problem in this stand. Also, dwarf mistletoe *(Arceuthobium abietinum)* was not found in grand fir in the area. The stand is about 50 miles north of the northern most range of this species of dwarf mistletoe[1/].

DOUGLAS-FIR

Douglas-fir has slightly more basal area and volume than grand fir, making it the most common species in the larger diameter classes. There were no living Douglas-fir seedlings or saplings. Two major pests are seriously impacting Douglas-fir on the site: laminated root rot and dwarf mistletoe (*A. douglasii*)-Tables 4A, 4B, 4C, and 4D. Nearly all of the mistletoed trees were alive, but many were infected severely. Some red-brown butt rot, caused by *Polyporus schweinitzii*, was found chiefly in larger diameter dead trees. Most of the trees classified as dead-unknown were too deteriorated to determine cause of death.

1/ Hawksworth, F. G. and D. Wiens. 1972. Biology and classification of dwarf mistletoes *(Arceuthobium)*. Agr. Hdbk. No. 401, USDA Forest Service, Washington, D.C. 234 p.

WESTERN LARCH

Larch occurs mainly as scattered individuals in this stand with little or no seedling or sapling size classes. Dwarf mistletoe (*A. laricis*) is causing the most damage in this species (Tables 5A, 5B, 5C, and 5D). About half of the infected trees were killed by this parasite; the remainder were infected seriously.

Laminated root rot appears to be causing the same amount of damage as in grand fir. However, about half of the root-diseased trees also were infected with dwarf mistletoe. Larch is classified as being intermediately susceptible to laminated root rot[2/]. Infected trees may die, but not at the same rate as a highly susceptible species such as grand fir. The combination of dwarf mistletoe and root rot probably is killing larch faster than if either disease were present alone.

Most trees classified as dead-unknown were too deteriorated to determine causal agent.

Other common larch pests, larch casebearer (*Coleophora laricella*) and two needle diseases, *Hypodermella laricis* and *Meria laricis*, were not found affecting plot trees. However, since larch is deciduous, evidence of insect feeding or fungal infections on foliage does not persist and is difficult to detect beyond the current season of activity.

WESTERN WHITE PINE

White pine represents a small component of the stand. Some seedlings and all the saplings found were killed by unidentified causes (Tables 6A, 6B, 6C, and 6D). Most of the larger white pine had been killed by past outbreaks of mountain pine beetle. There was evidence of some mortality caused by laminated root rot and Armillaria root rot in conjunction with the mountain pine beetle. White pine is classified as tolerant to laminated root rot; the species can be infected but usually only butt rot rather than mortality results.

Another serious pest of white pine, white pine blister rust caused by *Cronartium ribicola*, was not identified as infecting plot trees. However, this disease may have contributed to the death of trees recorded as killed by mountain pine beetle, since many of these trees were too deteriorated to make a positive identification for blister rust. Blister rust may not be a serious problem in this stand since no living trees were observed with infections. However, relatively few living trees were present in the stand.

2/ Hadfield, J. S. and D. W. Johnson. 1977. Laminated root rot -- a guide for reducing and preventing losses in Oregon and Washington forests, Forest Pest Management, Pacific Northwest Region, Portland, OR. 16 p.

LODGEPOLE PINE

Lodgepole forms a minor component of the stand and exists mainly in the smaller diameter classes including seedlings and saplings. Pest impact appears minimal on this species with some mortality caused by mountain pine beetle or Armillaria root rot (Tables 7A, 7B, 7C, and 7D). Most of the mortality could not be identified as to cause. Lodgepole is classified as tolerant to laminated root rot. A common and serious pest of lodgepole pine, dwarf mistletoe *(A. americanum)*, was not found on any plot trees in the stand.

WESTERN HEMLOCK

Hemlock is another minor component of the stand but does comprise part of the regeneration. Some of this regeneration was dead; possibly due to suppression (Tables 7A, 7B, 7C, and 7D). No serious damage was caused by pests in hemlock. Western hemlock is classified as intermediately susceptible to laminated root rot.

Some of the hemlocks were infected by *Fomes annosus*, primarily in dead trees. This fungus is spread by wind-borne spores and commonly infects hemlock through root contacts or stem wounds. It can cause substantial decay as trees mature. Hemlock mortality occasionally is caused indirectly by *F. annosus* as windthrow, stem breakage, or in association with other pests.

WESTERN REDCEDAR

Cedar is a minor species in the stand, mainly in low areas and drainages. In such locations, it comprises a major portion of the regeneration. No cedar mortality was observed in sample plots. Cedar is classified as resistant to laminated root rot.

PONDEROSA PINE

Ponderosa pine is a negligible component of the stands and is mentioned only because it may serve as a possible alternative species to plant or favor in laminated root rot centers since ponderosa is resistant to infection and mortality. No ponderosa pine mortality was observed in sample plots.

CONCLUSIONS AND RECOMMENDATIONS

Two disease problems are reducing productivity in the proposed Boundary Sale Area: laminated root rot and dwarf mistletoes. Of the two, dwarf mistletoes are the easier to manage since they are easy to detect, spread slowly, and die with their hosts. Prescriptions aimed at removing infected old-growth trees and preventing spread from infected residuals to susceptible understory will reduce much of the loss. This has been partially accomplished in the cut strata.

Laminated root rot is more difficult to manage since the disease is not easy to detect and persists on the site for decades after tree harvesting. Practical management involves favoring of tree species less susceptible to the disease.

Mountain pine beetle has caused severe damage to white pine in the stand. Limiting rotations to 120-140 years or sizes to 16 inches DBH should prevent future destructive epidemics. It may not be necessary to plant blister rust-resistant white pine since the disease was not found in the stand. However, it is recommended that a further evaluation be performed to hazard rate the site if substantial amounts of white pine are to be planted.

The following implications regarding diseases and insects should be considered in conjunction with the various silvicultural prescriptions for the sale area:

UNCUT STRATA

1. No treatment. Losses in the uncut strata due to root disease-caused tree mortality will average 1.2 trees/acre/year, representing 1.0 $ft.^2$/acre/year, 38 $ft.^3$/acre/year, and 172 bd. ft./acre/year. This excludes growth loss of living infected trees and loss due to butt decay caused by root pathogens. Losses due to dwarf mistletoe-caused mortality will average 0.3 trees/acre/year representing 0.4 $ft.^2$/acre/year, 14 $ft.^3$/acre/year, and 76 bd. ft./acre/year. This excludes growth loss of living infected trees which can be as much as 60 percent of the basal area growth in severely infected trees. Mortality from bark beetles, primarily mountain pine beetle, will decrease since most of the white pine already has been killed.

2. Sanitation - salvage. Most of the wood loss sustained above will be captured, especially that caused by dwarf mistletoes and bark beetles. However, losses caused by root diseases will continue in the present stand and may even accelerate. This may occur also in the cut strata if grand fir and Douglas-fir are allowed to regenerate.

3. Seed tree or shelterwood systems favoring larch, cedar, hemlock, and/or pine. Most of the merchantable timber will be harvested in one or a few operations. Future losses caused by root diseases will decrease since grand fir and Douglas-fir are most susceptible to laminated root rot. Dwarf mistletoe-free larch should be more resistant to laminated root rot than grand or Douglas-fir.

Dwarf mistletoe-infected overstory trees should be removed before susceptible understory reaches 3 feet tall or 10 years old, whichever occurs first. Cedar, western hemlock, and pine are not susceptible to either Douglas-fir or larch dwarf mistletoe. Larch is not susceptible to Douglas-fir dwarf mistletoe.

4. Clearcutting and replanting. All of the merchantable timber will be harvested in one operation. Grand fir or Douglas-fir should not be planted. Some reestablishment of these species will occur, but this can be minimized if units are large and seed trees near unit margins are removed. Also, dwarf mistletoe-infected larch along unit margins should be removed before regeneration becomes 3 feet tall or 10 years old. Although some infection and mortality from root diseases will occur as the new stand matures, losses will be reduced if grand fir and Douglas-fir are discriminated against. This alternative also is the most effective in reducing damage caused by dwarf mistletoes, bark beetles, and western spruce budworm.

5. Seed tree, shelterwood, or clearcut systems with stump removal. This alternative will be the most effective method for reducing infection and mortality caused by laminated root rot in residuals and regeneration, including grand fir and Douglas-fir, and hence the future stand by removing the bulk of fungus inoculum from the soil. However, steep topography and soil type in most of the area will render stump removal operations impractical.

We offer the following specific recommendations for pest management in the sale area:

CUT STRATA

1. Prevent regeneration of grand fir and Douglas-fir by (a) removing or destroying residuals of these species, especially dwarf mistletoe-infected trees, and (b) retaining as seed trees or planting larch, cedar, hemlock, or pine. Dwarf mistletoe-infected larch should be removed before larch regeneration is 3 feet tall or 10 years old, whichever occurs first.

It is highly unlikely that reestablishment of grand fir or Douglas-fir can be prevented, but a good mixture of these species with larch, cedar, hemlock, or pine will reduce incidence of root disease by limiting root-to-root disease spread.

2. During precommercial thinning, favor cedar, hemlock, pine, and mistletoe-free larch to reduce incidence of laminated root rot.

UNCUT STRATA

1. Remove as much of the grand fir and Douglas-fir as possible, including all unmerchantable material, especially at the middle and lower elevations of the area. Retain only larch, cedar, hemlock, and pine in the overstory to serve as seed trees, and in the understory to serve as potential crop trees to reduce incidence of laminated root rot. Remove dwarf mistletoe-infected larch before larch regeneration is 3 feet tall or 10 years old, whichever occurs first.

2. Plant larch, cedar, hemlock, or pine in areas inadequately stocked with these species or where no seed trees occur.

As in the cut strata, a mixture of susceptible and resistant trees will probably occur which should reduce root disease incidence.

3. Favor cedar, hemlock, pine, and mistletoe-free larch during precommercial thinning to reduce incidence of laminated root rot.

The information and recommendations presented in this report have been specifically formulated for the area we surveyed. Although some of this information may be applied to other areas in Oregon and Washington experiencing similar pest problems, these areas may be sufficiently different from the area we surveyed to warrant a separate biological evaluation to formulate management alternatives specific to that area. FPM pathologists encourage and are available to perform such evaluations at the request of land managers.

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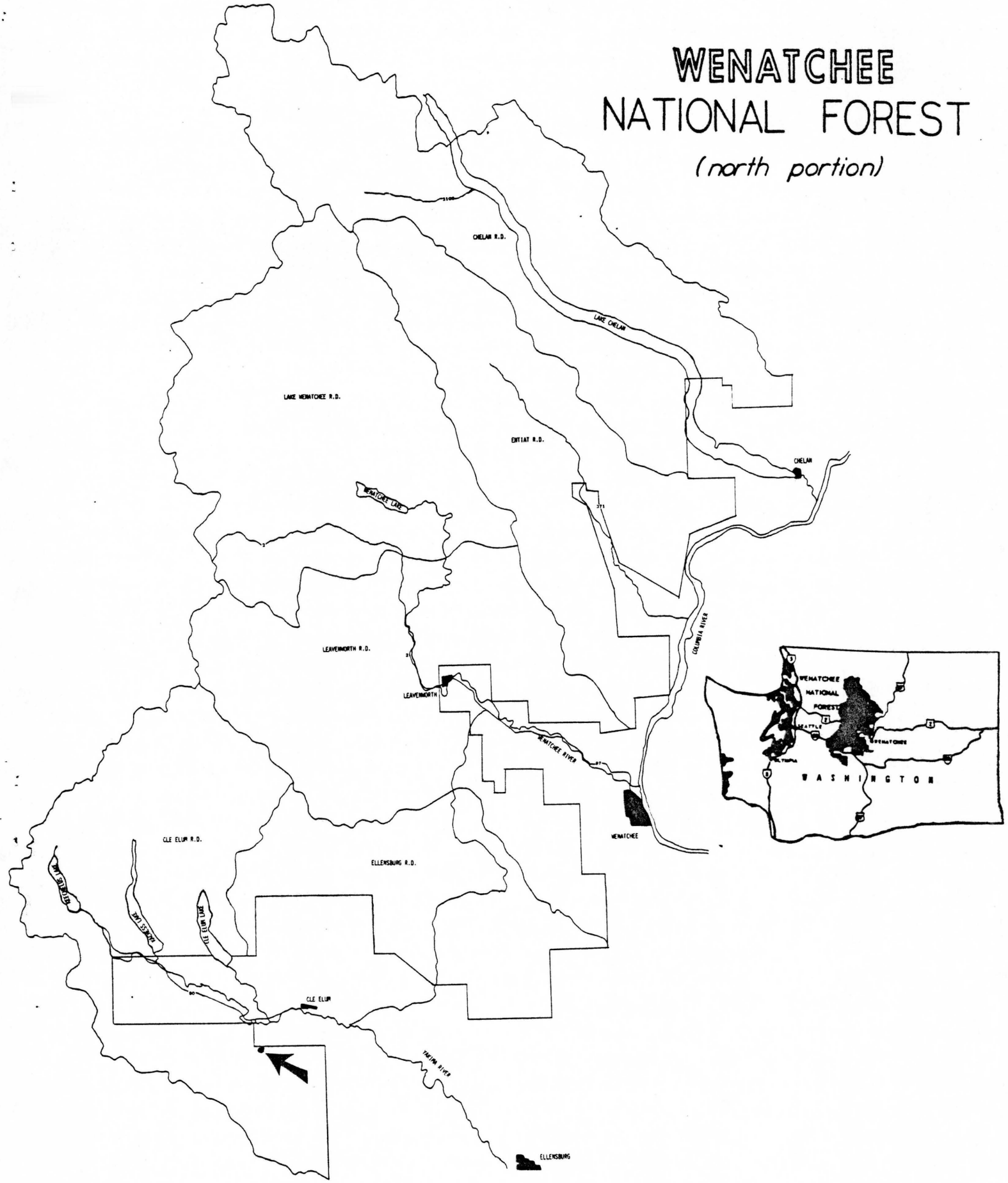

Figure 1 Map depicting area surveyed (arrow).

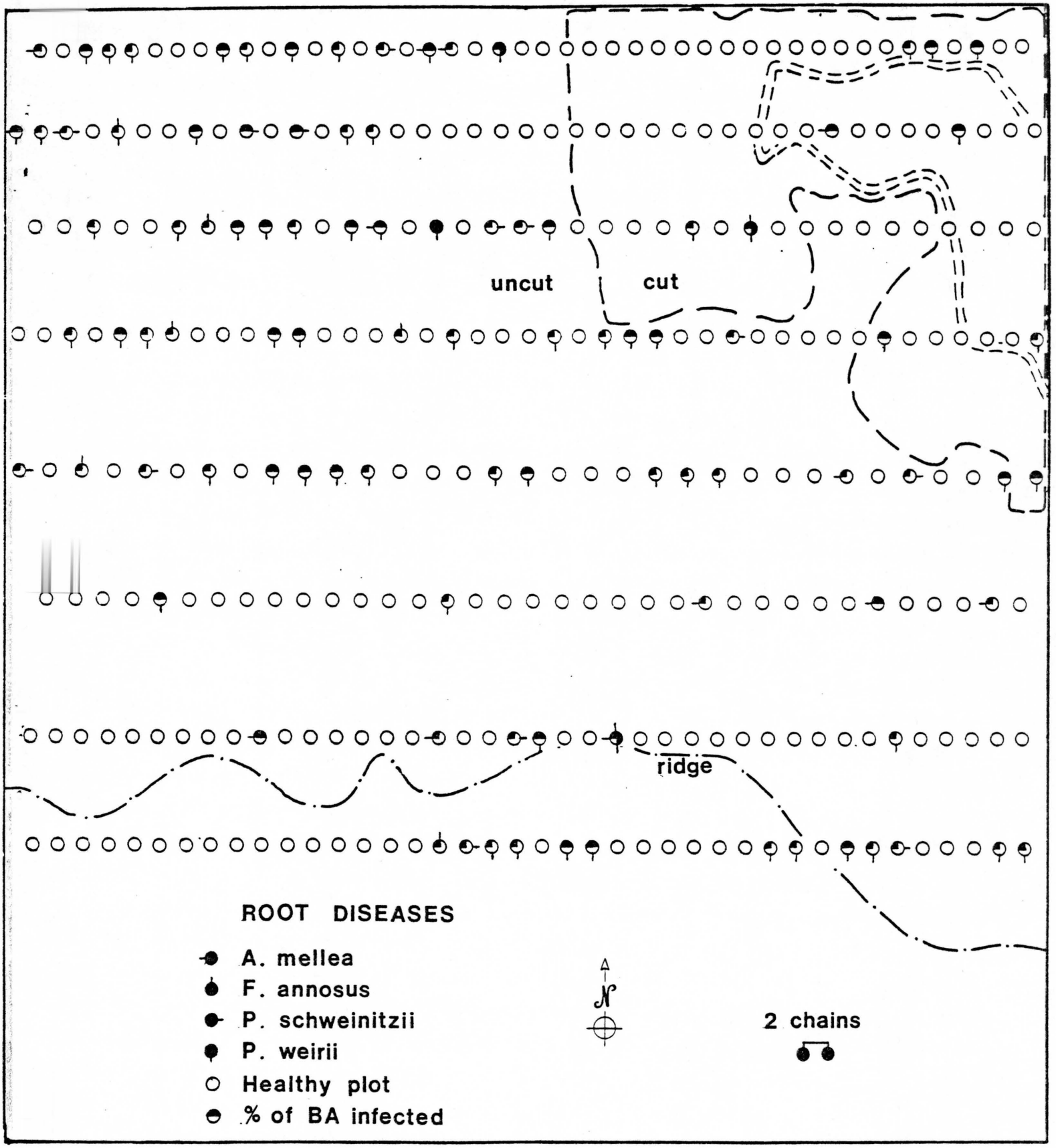

Figure 2 Map depicting location of survey plots with root disease.

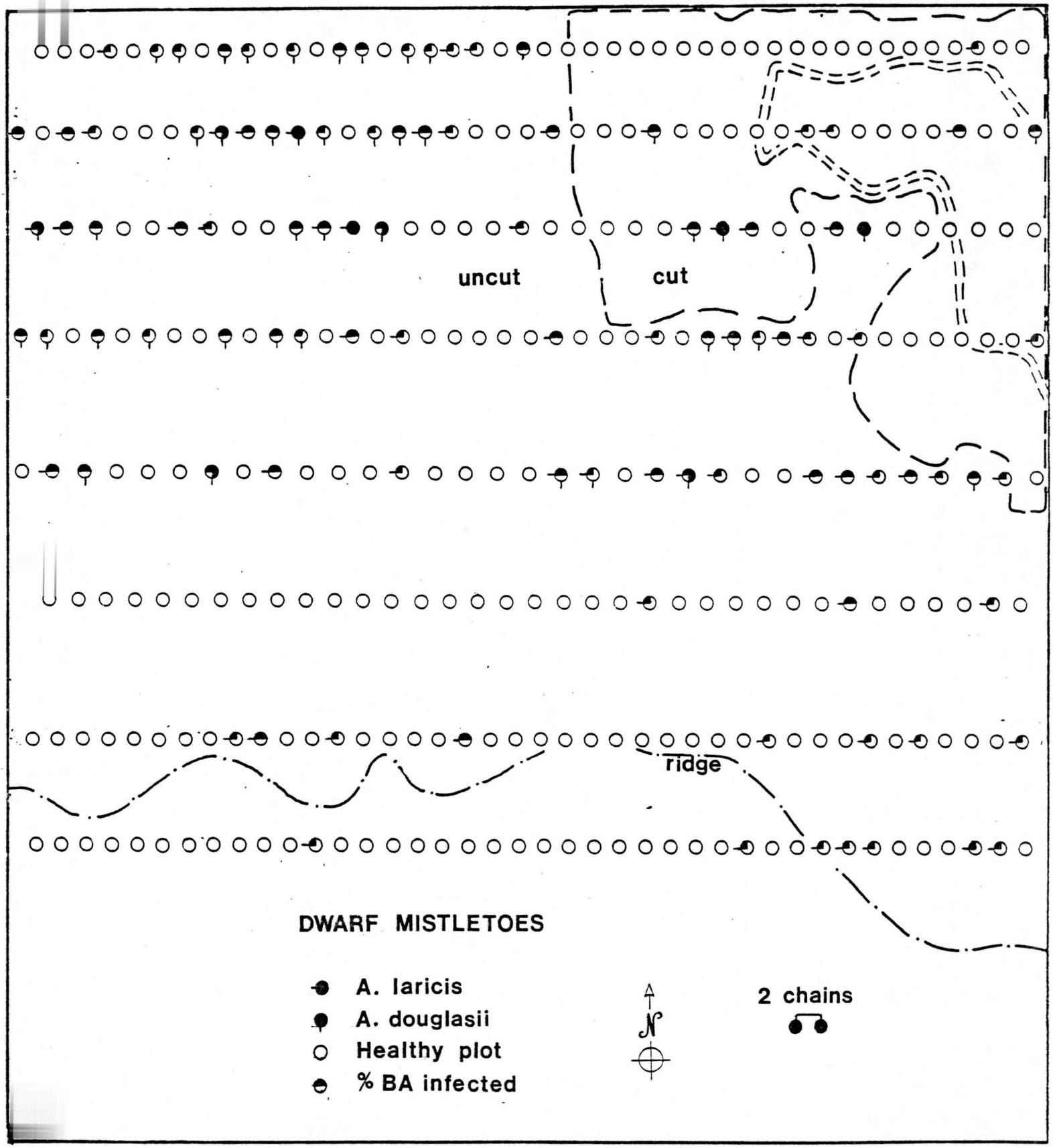

Figure 3 Map depicting location of survey plots with dwarf mistletoe.

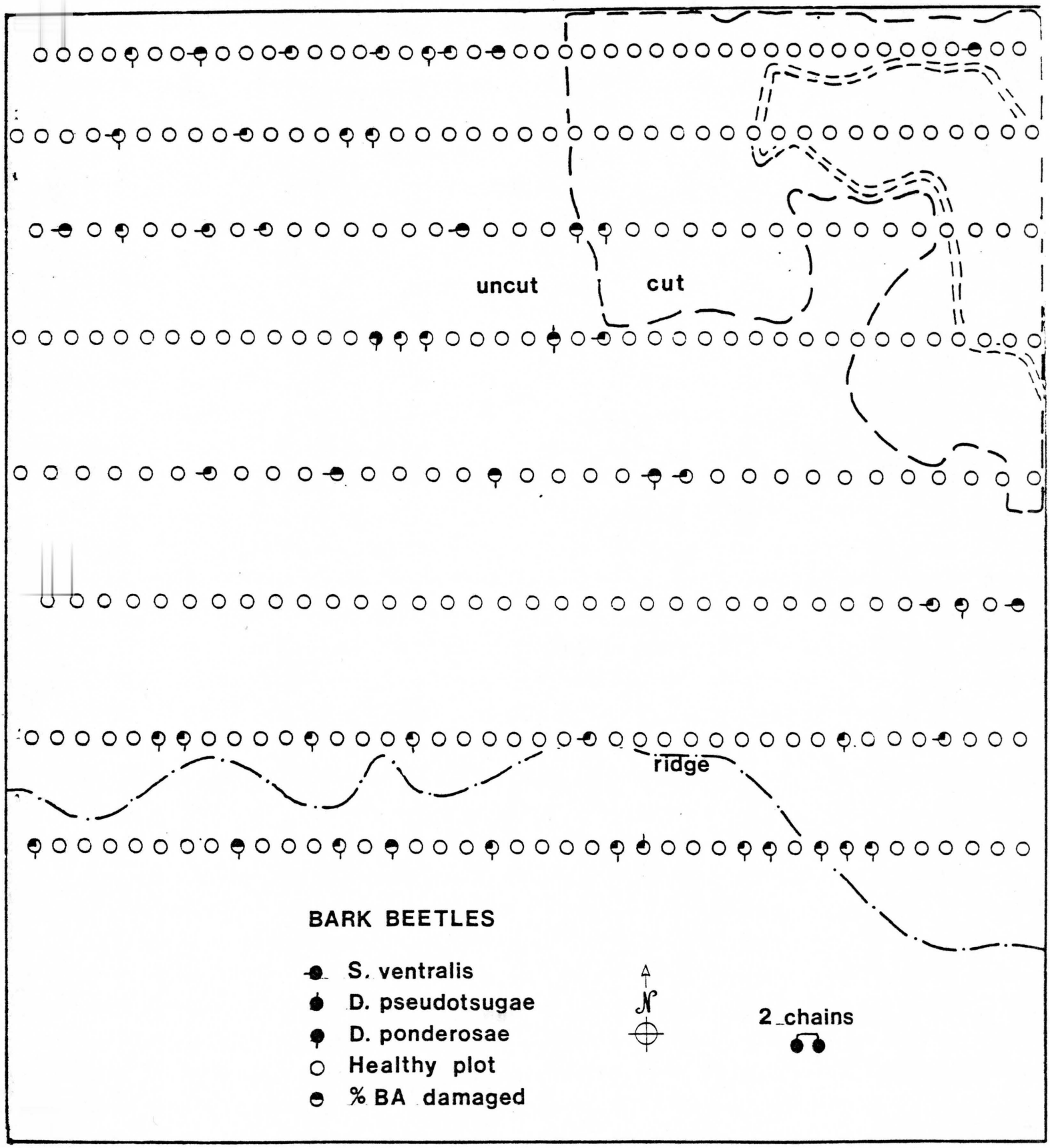

Figure 4 Map depicting location of survey plots with bark beetle damage.

Table 1A---Incidence (trees per acre) of diseases and insect damage for all tree species in the cut strata by DBH class

Diameter Class (in.)	Healthy	PW Live	DM Live	WPBR Live	DM Dead	PW Dead	AM Dead	SV Dead	PW&SV Dead	Dead X	Total
	- - - - - - - - - - - - - - - - TREES PER ACRE - - - - - - - - - - - - - - - -										
Seed	223.0									2.3	225.3
Sap	176.9		2.3			6.8				45.5	231.5
6	62.8	3.6				3.6	3.6		3.6	21.5	98.7
8	17.6				2.0			2.0		6.0	27.6
10	22.5		1.3			4.6				2.6	31.0
12	11.7		1.8		0.9	0.9					15.3
14	17.3			0.7							18.0
16	4.4		0.5			0.7					5.6
18	3.5					0.4				0.4	4.3
20	1.4										1.4
22	1.2				0.3	0.3				0.3	2.1
24	1.0										1.0
26	0.8										0.8
30	0.6										0.6
38			<0.1								<0.1
50										<0.1	<0.1
Total*	144.8	3.6	3.6	0.7	3.2	10.5	3.6	2.0	3.6	30.8	206.4
Percent*	70	2	2	<1	1	5	2	1	2	15	100

*Excludes seedlings and saplings

Abbreviations Used With All Tables

PW = *Phellinus weirii*
AM = *Armillaria mellea*
PS = *Polyporus schweinitzii*
FA = *Fomes annosus*
ET = *Echinodotium tinctorium*
DM = Dwarf mistletoe
WPBR = White pine blister rust
MPB = Mountain pine beetle
BB = Bark beetles
SV = *Scolytus ventralis*
Dead = Unknown or unidentifiable causes
X

Table 1B---Incidence (basal area per acre) of disease and insect damage for all tree species in the cut strata by DBH class

Diameter Class (in.)	Healthy	PW Live	DM Live	WPBR Live	DM Dead	PW Dead	AM Dead	SV Dead	PW&SV Dead	Dead X	Total
	- - - - - - - - - - - - BASAL AREA (FT^2) PER ACRE - - - - - - - - - - - -										
6	12.4	0.7		0.7		0.7	0.7		0.7	4.2	20.1
8	6.2				0.7			0.7		2.1	9.7
10	12.4		0.7			2.1				1.4	16.6
12	9.3		1.4		0.7	0.7					12.1
14	18.6										18.6
16	6.2		0.7			1.4					8.3
18	6.2					0.7				0.7	7.6
20	3.1										3.1
22	3.1					0.7				0.7	4.5
24	3.1				0.7						3.8
26	3.1										3.1
30	3.1									0.7	3.8
38			0.7								0.7
50										0.7	0.7
Total	86.8	0.7	3.5	0.7	2.1	6.3	0.7	0.7	0.7	10.5	112.7
Percent	77	<1	3	<1	2	6	<1	<1	<1	9	100

Table 1C---Incidence (cubic feet per acre) of diseases and insect damage for all tree species in the cut strata by DBH class

Diameter Class (in.)	Healthy	PW Live	DM Live	WPBR Live	DM Dead	PW Dead	AM Dead	SV Dead	PW&SV Dead	Dead X	Total
	- - - - - - - - - - - - - - -				CUBIC FEET PER ACRE						- - - - - - - - - - - - - - -
6	254.4	18.4				18.4	16.2		18.4	64.7	390.5
8	177.8				18.4			20.2		56.0	272.4
10	390.9		21.1			80.1				43.5	535.6
12	327.6		41.7		21.4	20.3					411.0
14	619.4			24.9							644.3
16	220.4		27.7			38.9					287.0
18	256.6					29.3				29.3	315.2
20	121.4										121.4
22	138.7				38.4	37.2				37.2	251.5
24	138.0										138.0
26	131.3										131.3
30	166.9										166.9
38			41.2								41.2
50										60.9	60.9
Total	2943.4	18.4	131.7	24.9	78.2	224.2	16.2	20.2	18.4	291.6	3767.2
Percent	78	<1	3	1	2	6	<1	1	<1	8	100

Table 1D---Incidence (board feet per acre) of diseases and insect damage for all tree species in the cut strata by DBH class

Diameter Class (in.)	Healthy	PW Live	DM Live	WPBR Live	DM Dead	PW Dead	AM Dead	SV Dead	PW&SV Dead	Dead X	Total
	- - - - - - - - - - - - - - - -				BOARD FEET PER ACRE						- - - - - - - - - - - - - - - -
10	1216		47			247				119	1629
12	1162		139		67	72					1440
14	3353			113							3466
16	1102		137			200					1439
18	1376					157				157	1690
20	700										700
22	836				234	221				221	1512
24	880										880
26	812										812
30	1105										1105
38			281								281
50										398	398
Total	12542	0	604	113	301	897	0	0	0	895	15352
Percent	82	0	4	<1	2	6	0	0	0	6	100

Table 2A. Incidence (trees per acre) of diseases and insect damage for all tree species in the uncut strata by DBH class

Diameter Class (in.)	Total	Healthy	DM Live	PW Dead	DM Dead	SV Dead	MPB Dead	DM PW Dead	PW SV Dead	Dead X
				TREES PER ACRE						
Seed	472.9	443.4		0.4						29.1
Sap.	381.4	349.1		4.0						28.3
6	58.6	42.2	0.8	4.5			0.8	0.8	2.4	7.1
8	56.2	45.5	0.8	1.7	0.4	0.4	0.9	0.4	1.3	4.8
10	36.0	25.0	2.0	3.1	0.6	0.2	1.4		0.6	3.1
12	23.6	18.2	1.9	0.8	1.0	0.4	0.6			0.7
14	21.0	16.8	1.0	0.9	0.7	0.1	0.1	0.1		1.3
16	14.6	11.3	0.6	1.0	0.3		0.8	0.2		0.4
18	12.6	9.2	0.4	1.1	0.2	0.1	0.4		0.3	0.9
20	6.2	4.1	0.8	0.2	0.2		0.1		0.1	0.7
22	4.2	2.3	0.7	0.2	0.1	0.1	0.2		0.1	0.5
24	2.3	0.9	0.6	0.2	0.2		0.1			0.3
26	2.4	1.4	0.6	0.1	<0.1					0.3
28	2.9	2.3	0.2	0.1	0.1			<0.1		0.2
30	1.4	0.8	0.2	0.2	0.1					0.1
32	0.9	0.5	0.2	<0.1	0.1					0.1
34	0.2	0.1	0.1	<0.1						<0.1
36	0.2	0.2	<0.1	<0.1						
38	<0.1		<0.1							<0.1
40	0.1	0.1	<0.1	<0.1						
42	<0.1									<0.1
44	<0.1		<0.1							
52	0.1	0.1								
Total*	243.5	181.0	10.9	14.1	4.0	1.3	5.4	1.5	4.8	20.5
Percent*	100	74	4	6	2	1	2	1	2	8

*Excludes seedlings and saplings
Also excludes all pests <1% of total

Table 2B. Incidence (basal area per acre) of diseases and insect damage for all tree species in the uncut strata by DBH class

Diameter Class (in.)	Total	Healthy	DM Live	PW Dead	PS Dead	DM Dead	SV Dead	MPB Dead	DM PS Dead	PW SV Dead	Dead X
					BASAL AREA (FT^2) PER ACRE						
6	12.0	8.8	0.4	0.8						0.5	1.5
8	20.7	16.8	0.3	0.7		0.2	0.2	0.2		0.5	1.8
10	20.6	14.4	1.1	1.7		0.3	0.2	0.3		0.3	2.3
12	20.7	15.2	1.3	0.7	0.2	0.8	0.3	0.8	0.2		1.2
14	25.1	19.2	1.1	1.2		0.8	0.2	0.5	0.4		1.7
16	20.4	16.8	0.9	1.4		0.5		0.2			0.6
18	24.2	17.9	0.7	1.9		0.3	0.2	1.1		0.5	1.6
20	14.5	9.3	1.6	0.5		0.5		0.7		0.2	1.7
22	11.3	6.4	1.9	0.5		0.3	0.2	0.2	0.2	0.3	1.3
24	7.9	3.2	2.0	0.7		0.6		0.4	0.2		0.8
26	10.0	5.8	2.0	0.5	0.5	0.2		0.3	0.2		0.5
28	12.5	10.2	0.9	0.3		0.3					0.8
30	7.2	4.0	1.0	0.5	0.2	0.8					0.7
32	5.8	3.2	1.1	0.2		0.5					0.8
34	2.3	0.8	0.6	0.5	0.2						0.2
36	2.0	1.6	0.2	0.2							
38	0.5		0.3								0.2
40	1.1	0.8	0.3								
42	0.3										0.3
	0.2		0.2								
	1.0	0.8			0.2						
Total*	220.3	155.2	17.9	12.3	1.3	6.1	1.3	4.7	1.2	2.3	18.0
Percent*	100	70	8	5	1	3	1	2	1	1	8

*Excludes all pests <1% of total

Table 2C. Incidence (cubic feet per acre) of diseases and insect damage for all tree species in the uncut strata by DBH class

Diameter Class (in.)	Total	Healthy	DM Live	PW Dead	PS Dead	DM Dead	SV Dead	MPB Dead	PW SV Dead	Dead X
				CUBIC FEET PER ACRE						
6	260.0	190.9	1.7	20.6				3.6	12.2	31.0
8	582.4	434.9	7.7	16.6		3.8	51.5	8.6	13.1	46.2
10	606.6	403.6	33.9	53.9		9.7	3.4	24.3	10.3	67.5
12	641.7	480.2	46.3	25.4	4.8	23.8	13.6	14.9		32.7
14	1240.7	1086.8	38.0	32.6		29.3	3.6	3.6		46.8
16	742.9	572.0	31.1	46.9		15.6		59.5		17.8
18	977.7	742.8	24.0	79.5		11.6	7.2	27.3	23.9	61.4
20	553.0	361.6	76.1	14.6		21.1		12.0	6.1	61.5
22	501.6	283.2	87.9	18.2		12.8	6.9	20.7	11.6	60.3
24	330.5	138.1	85.2	21.9		30.0		18.4		36.9
26	335.7	203.1	86.7	13.0	13.0	6.9				13.0
28	575.4	483.2	32.7	13.4		13.5				32.6
30	420.8	226.7	62.0	55.6	8.3	31.4				36.8
32	323.1	181.7	57.6	10.7		23.4				49.7
34	93.0	28.7	28.8	24.1	5.7					5.7
36	79.4	67.2	6.1	6.1						
38	24.7		16.5							8.2
40	66.8	49.0	17.8							
42	16.3									16.3
44	11.2		11.2							
46	58.0				58.0					
52	87.2	87.2								
Total	8528.7	6020.9	751.3	453.1	89.8	232.9	86.2	192.9	77.2	624.4
Percent*	100	71	9	5	1	3	1	2	1	7

*Excludes all pests <1% of total

Table 2D. Incidence (board feet per acre) of diseases and insect damage for all tree species in the uncut strata by DBH class

Diameter Class (in.)	Total	Healthy	DM Live	PW Dead	PS Dead	DM Dead	MPB Dead	PW SV Dead	Dead X
				BOARD FEET PER ACRE					
10	1715	1153	86	161		22	76	33	184
12	2058	1622	146	115	15	74	56		30
14	3512	2816	177	150		139	16		214
16	3731	2860	153	230		77	325		86
18	4927	3702	125	430		60	150	134	326
20	3143	2059	444	83		128	47	35	347
22	2974	1685	558	108		78	115	70	360
24	2045	867	536	139		184	88		231
26	2053	1247	529	78	78	43			78
28	3697	3114	207	85		85			206
30	2810	1524	409	368	55	207			247
32	2308	1335	386	80		160			347
34	551	189	191	95	38				38
36	531	451	40	40					
38	169		113						56
40	349	189	122	38					
42	114								114
44	78		78						
46	45				45				
52	628	628							
Total	37438	25441	4300	2200	231	1257	873	272	2864
Percent*	100	68	11	6	1	3	2	1	8

*Excludes all pests <1% of total

Table 3A. Incidence (trees per acre) of diseases and insect damage for grand fir in the uncut strata by DBH class

GRAND FIR

Diameter Class (in.)	Healthy	PW Live	ET Live	PW Dead	FA Dead	AM Dead	SV Dead	FA & SV Dead	PW & SV Dead	AM & SV Dead	FA & PW Dead	Dead X
	-Trees Per Acre-											
Seed	266.0			0.4								26.9
Sap	284.9			4.0	1.8							24.7
6	34.6			3.7					2.4			4.7
8	30.3	0.4		0.9			0.4		1.3			1.3
10	9.7			1.7	0.3		0.2	0.2	0.6			1.1
12	4.8			0.6	0.2		0.4			0.4		0.1
14	5.6	0.1		0.1	0.1		0.1				0.1	0.3
16	3.8			0.2								
18	3.0			0.3			0.09		0.3			
20	1.4			0.1					0.07			
22				0.05	0.06		0.06		0.1			0.2
24	0.5		0.05	0.05		0.05						0.05
26												
28	0.5											
30	0.2											0.03
32	0.4			0.03								0.03
40	0.1			0.02								
Total* 118.7	194.9	0.5	0.1	7.8	0.7	0.1	1.3	0.2	4.8	0.4	0.1	7.8
Percent*	80	<1	<1	7	<1	<1	1	<1	4	<1	<1	7

*Excludes saplings and seedlings

Table 3B. Incidence (basal area per acre) of diseases and insect damage for grand fir in the uncut strata by DBH class

GRAND FIR

Diameter Class (in.)	Healthy	PW Live	ET Live	PW Dead	FA Dead	AM Dead	SV Dead	FA & SV Dead	PW & SV Dead	AM & SV Dead	FA & PW Dead	Dead X
	Basal Area (Ft^2) Per Acre											
6	7.2			.6					.5			.9
8	11.2	.2		.3			.2		.5			.5
10	5.6			.9	.2		.2	.2	.3			.6
12	4.0			.5	.2		.3			.2		.2
14	6.4	.2		.2	.2		.2				.2	.3
16	5.6			.3								
18	5.6			.5			.2		.5			
20	3.2			.3					.2			
22				.2	.2		.2		.3			.5
24	1.6		.2	.2		.2						.2
26												
28	2.4											
30	0.8											.2
32	2.4			.2								.2
40	0.8			.2								
Total 70.6	56.8	.4	.2	4.4	.8	.2	1.3	.2	2.3	.2	.2	3.6
Percent	80	<1	<1	6	1	<1	2	<1	4	<1	<1	6

Table 3C. Incidence (cubic feet per acre) of diseases and insect damage for grand fir in the uncut strata by DBH class

GRAND FIR

Diameter Class (in.)	Healthy	PW Live	ET Live	PW Dead	FA Dead	AM Dead	SV Dead	FA & SV Dead	PW & SV Dead	AM & SV Dead	FA & PW Dead	Dead X
	Cubic Feet Per Acre											
6	176.4			18.9					12.2			24.0
8	306.0	3.8		9.1			51.5		13.1			13.1
10	166.8			29.2	5.2		3.4	3.4	10.3			18.9
12	163.2			20.4	6.8		13.6			13.6		3.4
14	203.8	3.6		3.6	3.6		3.6				3.6	10.9
16	210.9			11.1								
18	303.2			23.9			7.2		23.9			
20	121.4			8.7					6.1			
22				5.8	6.9		6.9		11.6			23.1
24	80.5		8.1	8.1		8.1						8.1
26												
28	139.8											
30	59.8											9.0
32	142.7			10.7								10.7
40	49.0			9.8								
Total 2634.1	2123.5	7.4	8.1	159.3	22.5	8.1	86.2	3.4	77.2	13.6	3.6	121.2
Percent	81	<1	<1	6	1	<1	3	<1	3	<1	<1	5

Table 3D. Incidence (board feet per acre) of diseases and insect damage for grand fir in the uncut strata by DBH class

GRAND FIR

Diameter Class (in.)		Healthy	PW Live	ET Live	PW Dead	FA Dead	AM Dead	SV Dead	FA & SV Dead	PW & SV Dead	AM & SV Dead	FA & PW Dead	Dead X
		Board Feet Per Acre											
10		534			94	17		11	11	33			61
12		662			83	28		55			55		14
14		941	17		17	17		17				17	50
16		1083			57								
18		1344			134			40		134			
20		700			50					35			
22					35	42		42		70			139
24		507		51	51		51						51
26													
28		936											
30		419											63
32		1068			80								80
40		189			38								
Total	10223	8383	17	51	639	104	51	165	11	272	55	17	458
Percent		82	<1	<1	6	1	<1	2	<1	3	<1	<1	4

Table 4A. Incidence (trees per acre) of diseases and insect damage for Douglas-fir in the uncut strata by DBH class

DOUGLAS-FIR

Diameter Class (in.)	Healthy	DM Live	AM Dead	PW Dead	DM Dead	DFB Dead	PS Dead	PW & AM Dead	DM & PS Dead	Dead X
	- Trees Per Acre -									
Seed										
Sap		0.4								0.9
6			0.8							
8	8.6	0.8		0.4	0.4					1.8
10	8.3	0.9		1.1						0.9
12	8.6	0.9		0.2						0.6
14	4.2	0.6		0.7					0.1	0.7
16	5.4	0.2	0.1	0.8	0.1					0.4
18	3.8	0.09		0.6				0.08		0.6
20	1.4	0.4		0.07						0.6
22	2.0	0.4		0.1						0.3
24	0.2	0.4		0.1		0.05				0.1
26	1.0	0.4		0.1			0.1		0.04	0.1
28	1.2	0.07		0.07						0.1
30	0.6	0.2		0.2	0.09	0.03	0.03			0.1
32	0.1	0.1			0.06					0.1
34	0.1	0.05		0.05			0.02			0.02
36	0.1	0.02		0.02						
38		0.04								0.02
40		0.04								
42										0.03
44		0.02								
46							0.01			
52	0.1									
Total	45.7	5.6	0.9	4.5	0.7	0.1	0.2	0.1	0.1	6.5
64.4										
Percent	71	9	1	7	1	<1	<1	<1	<1	10

Table 4B. Incidence (basal area per acre) of diseases and insect damage for Douglas-fir in the uncut strata by DBH class

DOUGLAS-FIR

Diameter Class (in.)	Healthy	DM Live	AM Dead	PW Dead	DM Dead	DFB Dead	PS Dead	PW & AM Dead	DM & PS Dead	Dead X
	Basal Area (Ft^2) Per Acre									
6		.2	.2							
8	3.2	.3		.2	.2					.6
10	4.8	.5		.6						.5
12	7.2	.5		.2						.5
14	4.8	.6		.8					.2	.8
16	8.0	.3	.2	1.1	.2					.6
18	7.2	.2		1.1				.2		1.1
20	3.2	.8		.2						1.4
22	5.6	1.1		.3						.8
24	0.8	1.2		.5		.2				.3
26	4.0	1.4		.5			.5		.2	.5
28	5.6	.3		.3						.5
30	3.2	.8		.5	.6	.2	.2			.5
32	0.8	.6			.5					.6
34	0.8	.3		.3			.2			.2
36	0.8	.2		.2						
38		.3								.2
40		.3								
42										.3
44		.2								
46							.2			
52	0.8									
Total	60.8	10.1	.4	6.8	1.5	.4	1.1	.2	.4	9.4
91.1 Percent	67	11	<1	7	2	<1	1	<1	<1	10

Table 4C. Incidence (cubic feet per acre) of diseases and insect damage for Douglas-fir in the uncut strata by DBH class

DOUGLAS-FIR

Diameter Class (in.)	Healthy	DM Live	AM Dead	PW Dead	DM Dead	DFB Dead	PS Dead	PW & AM Dead	DM & PS Dead	Dead X
	Cubic Feet Per Acre									
6			3.6							
8	82.6	7.7		3.8	3.8					17.3
10	148.6	16.1		19.7						16.1
12	215.0	22.5		5.0						15.0
14	626.2	21.3		24.8					3.6	24.8
16	241.4	8.9	4.5	35.8	4.5					17.8
18	278.5	6.6		44.0				5.9		44.0
20	118.7	33.9		5.9						50.9
22	247.8	49.5		12.4						37.2
24	27.6	55.2		13.8		6.9				13.8
26	130.1	52.0		13.0			13.0		5.2	13.0
28	229.3	13.4		13.4						19.1
30	166.9	55.6		55.6	25.0	8.3	8.3			27.8
32	39.0	39.0			23.4					39.0
34	28.7	14.3		14.3			5.7			5.7
36	30.5	6.1		6.1						
38		16.5								8.2
40		17.8								
42										16.3
44		11.2								
46							58.0			
52	87.2									
Total 3959	2698.1	447.6	8.1	267.6	56.7	15.2	85.0	5.9	8.8	366.0
Percent	68	11	<1	7	1	<1	2	<1	<1	9

Table 4D, Incidence (board feet per acre) of diseases and insect damage for Douglas-fir in the uncut strata by DBH class

DOUGLAS-FIR

Diameter Class (in.)		Healthy	DM Live	AM Dead	PW Dead	DM Dead	DFB Dead	PS Dead	PW & AM Dead	DM & PS Dead	Dead X
		Board Feet Per Acre									
10		423	46		56						46
12		688	72		32						16
14		680	97		113					16	113
16		1166	43	22	173	22					86
18		1493	35		236				31		236
20		661	189		33						283
22		1474	324		73						221
24		176	352		88		44				88
26		781	312		78			78		31	78
28		1450	85		85						121
30		1105	368		368	166	55	55			184
32		267	267			160					267
34		189	95		95			38			38
36		201	40		40						
38			113								56
40			122								
42											114
44			78								
46								45			
52		628									
Total	18200	11382	2638	22	1470	348	99	216	31	47	1947
Percent		63	14	<1	8	2	1	1	<1	<1	11

Table 5A. Incidence (trees per acre) of diseases and insect damage in western larch in the uncut strata by DBH class

WESTERN LARCH

Diameter class (in.)	Healthy	DM Live	PW Dead	DM & AM Dead	DM & PS Dead	DM & PW Dead	PS Dead	DM & FA Dead	DM, PS & AM Dead	DM Dead	Dead X
	Trees Per Acre										
Seed											
Sap											
6	3.8	0.8	0.8			0.8					0.8
8			0.4	0.4		0.4		0.4			1.3
10		1.1	0.3							0.6	1.4
12		1.0			0.2		0.2			1.0	0.6
14	2.1	0.4	0.1		0.1	0.1				0.7	0.1
16		0.4				0.2				0.2	
18		0.3	0.2							0.2	0.3
20	0.3	0.4								0.2	0.1
22		0.3			0.06					0.1	
24	0.2	0.2		0.05	0.05					0.2	0.1
26		0.2								0.04	
28	0.4	0.1				0.04			0.04	0.07	0.07
30		0.03								0.03	
32		0.08									
34		0.05		0.02							
36	0.1										
Total 25.2	6.9	5.4	1.8	0.5	0.4	1.5	0.2	0.4	<0.1	3.3	4.8
Percent	27	21	7	2	2	6	1	2	<1	13	19

Table 5B. Incidence (basal area per acre) of diseases and insect damage for western larch in the uncut strata by DBH class

WESTERN LARCH

Diameter class (in.)	Healthy	DM Live	PW Dead	DM & AM Dead	DM & PS Dead	DM & PW Dead	PS Dead	DM & FA Dead	DM, PS & AM Dead	DM Dead	Dead X
	Basal Area (Ft^2) per acre										
6	0.8	0.2	0.2			0.2					0.2
8			0.2	0.2		0.2		0.2			0.5
10		0.6	0.2							0.3	0.8
12		0.8			0.2		0.2			0.8	0.5
14	2.4	0.5	0.2		0.2	0.2				0.8	0.2
16		0.6				0.3				0.3	
18		0.5	0.3							0.3	0.5
20	0.8	0.8								0.5	0.3
22		0.8			0.2					0.3	
24	0.8	0.8		0.2	0.2					0.6	0.3
26		0.6								0.2	
28	1.6	0.6				0.2			0.2	0.3	0.3
30		0.2								0.2	
32		0.5									
34		0.3		0.2							
36	0.8										
Total 27.4	7.2	7.8	1.1	0.6	0.8	1.1	0.2	0.2	0.2	4.6	3.6
Percent	26	28	4	2	3	4	1	1	1	17	13

Table 5C. Incidence (cubic feet per acre) of diseases and insect damage in western larch in the uncut strata by DBH class

WESTERN LARCH

Diameter class (in.)	Healthy	DM Live	PW Dead	DM & AM Dead	DM & PS Dead	DM & PW Dead	PS Dead	DM & FA Dead	DM, PS & AM Dead	DM Dead	Dead X
	Cubic Feet Per Acre										
6	8.0	1.7	1.7			1.7					1.7
8			3.7	3.7		3.7		3.7			12.0
10		17.8	5.0							9.7	22.7
12		23.8			4.8		4.8			23.8	14.3
14	87.8	16.7	4.2		4.2	4.2				29.3	4.2
16		22.2				11.1				11.1	
18		17.4	11.6							11.6	17.4
20	31.7	42.2								21.1	10.6
22		38.4			7.7					12.8	
24	30.0	30.0		7.5	7.5					30.0	15.0
26		34.7								6.9	
28	77.3	19.3				7.7			7.7	13.5	13.5
30		6.4								6.4	
32		18.6									
34		14.5		5.8							
36	36.7										
Total 974.8	271.5	303.7	26.2	17.0	24.2	28.4	4.8	3.7	7.7	176.2	111.4
Percent	28	31	3	2	3	3	<1	<1	1	18	11

Table 5D. Incidence (board feet per acre) of diseases and insect damage in western larch in the uncut strata by DBH class

WESTERN LARCH

Diameter Class (in.)		Healthy	DM Live	PW Dead	DM & AM Dead	DM & PS Dead	DM & PW Dead	PS Dead	DM & FA Dead	DM, PS, AM Dead	DM Dead	Dead X
						Board Feet Per Acre						
10			40	11							22	50
12			74			15		15			74	
14		418	80	20		20	20				139	20
16			110				55				55	
18			90	60							60	90
20		191	255								128	64
22			234			47					78	
24		184	184		46	46					184	92
26			217								43	
28		488	122				49			49	85	85
30			41								41	
32			119									
34			96		38							
36		250										
Total	4994	1531	1662	91	84	128	124	15	0	49	909	401
Percent		31	33	2	2	3	2	<1	0	1	18	8

Table 6A. Incidence (trees per acre) of diseases and insect damage for western white pine in the uncut strata by DBH class

WESTERN WHITE PINE

Diameter Class (in.)	Healthy	MPB Dead	MPB & PW Dead	MPB & AM Dead	Dead X
	- - - - - - - - - - Trees per acre - - - - - - - - - - - - - -				
Seed	7.5				
Sap					5.7
6		.8			.8
8		.9			.4
10		1.1			
12		.6		.2	
14		.1			.1
16		.8	.09		
18	0.3	.3	.08		
20		.1	.11		
22		.1			
24		.1			
26	0.2				
Total 5.9	0.5	4.9	.3	.2	.1
Percent	8	83	5	3	1

Table 6B. Incidence (basal area per acre) of diseases and insect damage for western white pine in the uncut strata by DBH class

WESTERN WHITE PINE

Diameter Class (in.)	Healthy	MPB Dead	MPB & PW Dead	MPB & AM Dead	Dead X
	- - - - - - - - - - Basal Area (Ft^2) per acre - - - - - -				
6		.2			.2
8		.3			.2
10		.6			
12		.5		.2	
14		.2			.2
16		1.1	.2		
18	0.8	.5	.2		
20		.2	.2		
22		.2			
24		.3			
26	0.8				
Total* 7.1	1.6	4.1	.6	.2	.6
Percent*	23	58	8	3	8

*Excludes sapling and seedling data

Table 6C. Incidence (board feet per acre) of diseases and insect damage for western white pine in the uncut strata by DHB class

WESTERN WHITE PINE

Diameter Class (in.)		Healthy	MPB Dead	MPB & PW Dead	MPB & AM Dead	Dead X
			Board Feet Per Acre			
10			65			
12			56		19	
14			16			16
16			325			
18		122	126	37		
20			47	34		
22			73	52		
24			88			
26		236				
Total	1312	358	796	123	19	16
Percent		27	61	9	2	1

Table 6D. Incidence (volume per acre) of diseases and insect damage for western white pine in the uncut strata by DBH class

WESTERN WHITE PINE

Diameter Class (in.)	Healthy	MPB Dead	MPB & PW Dead	MPB & AM Dead	Dead X
			Cubic Feet Per Acre		
6		3.6			3.6
8		8.6			3.8
10		19.7			
12		14.9			
14		3.6		5.0	3.6
16		59.5	6.7		
18	22.5	22.5	6.0		
20		12.0	9.3		
22		13.8			
24		18.4			
26	36.7				
Total 273.8	59.2	176.6	22.0	5.0	11.0
Percent	22	64	8	2	4

Table 7A. Incidence (trees per acre) of diseases and insect damage for lodgepole pine, western hemlock, western redcedar, and ponderosa pine in the uncut strata by DBH class

Diameter Class (in.)	LODGEPOLE PINE				WESTERN HEMLOCK			WESTERN REDCEDAR	PONDEROSA PINE
	Healthy	MPB Dead	AM Dead	Dead X	Healthy	FA Dead	Dead X	Healthy	Healthy
	Trees Per Acre								
Seed	1.9				50.9		2.2	117.0	
Sap	1.9			0.5	17.9		0.4	34.0	
6				0.8				3.8	
8	2.2				2.2			2.2	
10	4.2	0.3		0.3			0.3	2.8	
12			0.2		1.9	0.2		1.0	1.9
14	0.7				3.5		0.1	0.7	
16	0.5				1.6				
18		0.08			2.1	0.09			
20					0.7			0.3	
22		0.06			0.3				
24									
26					0.2				
28								0.2	
Total*	7.6	0.5	0.2	1.1	12.5	0.3	0.4	11.0	1.9
Percent*	81	5	2	12	95	2	3	100	100

*Excludes sapling and seedling data

Table 7B. Incidence (basal area per acre) of diseases and insect damage for lodgepole pine, western hemlock, western redcedar, and ponderosa pine in the uncut strata by DBH class

Diameter Class (in.)	LODGEPOLE PINE				WESTERN HEMLOCK			WESTERN REDCEDAR	PONDEROSA PINE
	Healthy	MPB Dead	AM Dead	Dead X	Healthy	FA Dead	Dead X	Healthy	Healthy
	Basal Area (ft^2) Per Acre								
6				0.2				0.8	
8	0.8				0.8			0.8	
10	2.4	0.2		0.2			0.2	1.6	
12			0.2		1.6	0.2		0.8	1.6
14	0.8				4.0		0.2	0.8	
16	0.8				2.4				
18		0.2			4.0	0.2			
20					1.6			0.8	
22		0.2			0.8				
24									
26					0.8				
28								0.8	
Total	4.8	0.6	0.2	0.4	16.0	0.4	0.4	6.4	1.6
Percent	80	10	3	7	95	2	2	100	100

Table 7C, Incidence (cubic feet per acre) of diseases and insect damage for lodgepole pine, western hemlock, western redcedar, and ponderosa pine in the uncut strata by DBH class

Diameter Class (in.)	LODGEPOLE PINE				WESTERN HEMLOCK			WESTERN REDCEDAR	PONDEROSA PINE
	Healthy	MPB Dead	AM Dead	Dead X	Healthy	FA Dead	Dead X	Healthy	Healthy
	Cubic Feet Per Acre								
6				1.7				6.5	
8	12.8				12.8			20.7	
10	63.8	4.6		4.6			5.2	24.4	
12			4.4		44.7	4.7		18.5	38.8
14	29.3				114.8		3.3	24.9	
16	27.7				92.0				
18		4.8			138.6	5.9			
20					64.3			25.5	
22		6.9			35.4				
24									
26					36.3				
28								36.8	
Total	133.6	16.3	4.4	6.3	538.9	10.6	8.5	157.3	38.8
Percent	83	10	3	4	97	2	1	100	100

Table 7D. Incidence (board feet per acre) of diseases and insect damage for lodgepole pine, western hemlock, western redcedar, and ponderosa pine in the uncut strata by DBH class

Diameter Class (in.)	LODGEPOLE PINE				WESTERN HEMLOCK			WESTERN REDCEDAR	PONDEROSA PINE
	Healthy	MPB Dead	AM Dead	Dead X	Healthy	FA Dead	Dead X	Healthy	Healthy
	Board Feet Per Acre								
10	160	11		11			16	36	
12			14		173	18		60	39
14	139				525		15	113	
16	137				474				
18		24			743	32			
20					366			141	
22		42			211				
24									
26					230				
28								240	
Total	436	77	14	11	2722	50	31	590	39
Percent	81	14	3	2	97	2	1	100	100